A BLOWFLY TRAP FOR STANDARDIZED FIELD SAMPLING[1]

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ABSTRACT: A useful trap for population studies on blowflies is described. This trap has advantages over others of its kind due to its simple construction and low cost. It also may be used for accumulative as well as non-accumulative adult trapping.

Literature on traps, chemical attractants, and other devices to collect adult insects is quite abundant (Bram 1978, Williams 1951). On the other hand, the majority of collecting methods and apparatus designed to collect adult Diptera are mostly for studies on mosquitoes, the Mediterranean fruit fly (*Ceratitis capitata* Wiedemann) and other tephritids, and the primary screwworm fly (*Cochliomyia hominivorax* Coquerel) (Brockway 1962, Cunningham et al. 1978, Villegas and Coto (1981). Although many of the necrophilous blowfly species are commonly collected in traps primarily designed for screwworm flies (as non target species), there are very few specifically designed for standardized trapping of this group of calliphorids (Bishop 1916, Vogt and Havenstein 1974).

Collecting blowfly adults in the field is not a hard task. Liver baits, live or dead animals, and even chemical attractants are very effective (Broce et al. 1977, Coppedge et al. 1977, 1981). Moreover the best way to measure population density fluctuations over several weeks or months in a given area is to use a standardized bait for necrophilic species. An adequate and safe trap is important, otherwise vertebrate scavengers will steal the bait. In some cases, bait does not last overnight in the field.

The object of this report is to describe an efficient and inexpensive blowfly trap which, by "sampling" blowflies at certain hours, weather conditions, etc., is able to detect differences in the behavior of natural populations. This is not possible using existing blowfly traps. This trap is useful for both cumulative and non-cumulative insect trapping.

MATERIALS AND METHODS

This trap is constructed of two green-painted wooden frames, a pole (1.30m) and two plastic pans. The outer frame fits over the inner frame (30 x 30 x 7.5 cm, extern. measur.) which is attached to the support pole (7.5 x 7.5 x 130 cm) by a 20 cm strip (Fig. 1A). The inner frame holds one

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of the plastic pans, which has five drain holes in the bottom (Fig. 1B). The outer frame (31 x 34 x 7.5 cm) has a 1.3 cm mesh screen over its upper side.

For collecting calliphorid flies as well as other carrion insects, a dead rat or chemical attractant or other bait is placed inside the bottom pan. Then the outer frame is put in place (Fig. 1C). Several hours or days later, the upper pan is carefully dropped over the screen on the upper frame. A few seconds later, 1.5 ml of chloroform are injected through a tiny hole in the pan wall, and the insects are easily collected once activity ceases (Fig. 1D).

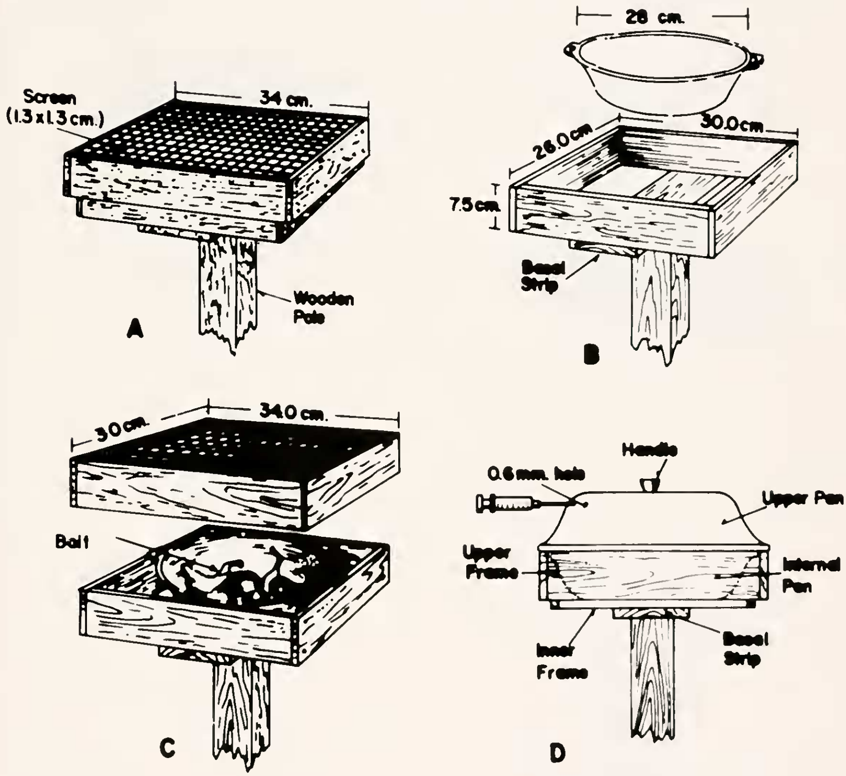

Fig. 1. Non-cumulative blowfly trap. A. assembled trap; B. The inner frame attached to the basal pole and the bait holding (internal) plastic pan; C. Exploded view of trap; D. trap in operating position (upper pan added).

RESULTS AND DISCUSSION

In our studies on blowfly population fluctuations in Costa Rica, we have been using this type of trap over many weeks with satisfactory results. In spite of being a very simple trap baited with a relatively small rat (approx. 200 g), we have collected up to 204 adult blowfly specimens in one sample. Unfortunately, in entomological literature, we could not find any non-cumulative trap to be compared with the one presented here. A non-cumulative trap like this permits the obtaining of data on the effect of different weather factors on the behavior of natural populations. Utilizing this trap we have observed that sampling rates improve with high luminosity

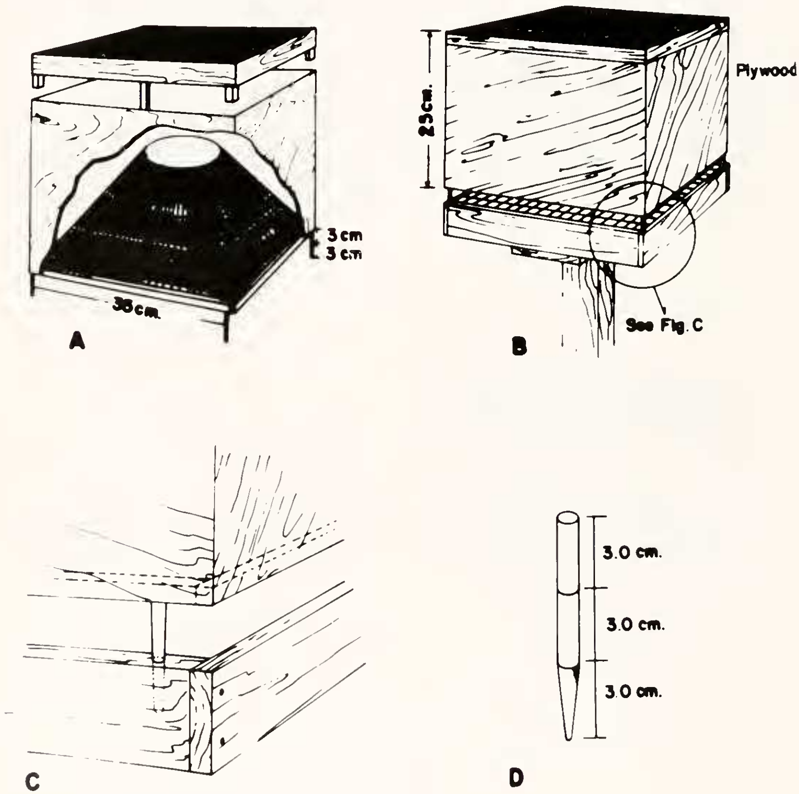

Fig. 2. A. Cumulative collecting box; B. Box attached to trap; C. Corner of accumulative collecting box attached to upper frame by mean of stell pin; D. Steel pin.

and relative humidity.

This trap can also be used for cumulative sampling, simply by placing a collecting box 3.0 cm above the upper frame (Fig. 2A). The four sides of the collecting box are made of thin plywood. The cover is made of mosquito screen. Internally, there is an inverted screen funnel with an opening of 2.0 cm, so that the insects can not escape through the bottom (Fig. 2B). The collecting box fits into the trap by inserting its four legs (steel pins) at the corners, into the 3.0 cm holes in the outer frame (Figs. 2C, 2D). To remove the insects, cover the top and bottom with plywood or cardboard and inject a small amount of chloroform or ether. With this attachment, baited with a rat, we have captured up to 414 adult flies in one week.

In general, absolute catching rates with our cumulative trap are clearly lower than those of Vogt and Havenstein (1974), who obtained as many as 2300 blowflies in one day from a single trap. However, in spite of the fact that both traps are comparable, ecological conditions in which they were used were very different: a sheep pasture in Australia compared with a secondary succession wet forest in Costa Rica. It is well known that in tropical wet forests the variety of species is much higher, and insect populations tend to maintain low densities. While we captured as many as nine species of blowflies from natural populations, Vogt and Havenstein (1974) reported only one, the sheep blowfly, *Lucilia (= Phaenicia) cuprina* (Wied.) in a very altered habitat.

Trap collecting of insects is affected by factors such as kind of bait, trap location, color, size, and trap height (Bram 1978). However, in many cases these differences may be interpreted as insect interspecific preferences for food, attractants, micro-climate, vertical distribution, etc. By utilizing this kind of trap, we have noticed differences in number and proportions of blowfly species at different trap heights in Costa Rican species.

In conclusion we consider the non-cumulative trap very useful for ecological studies on the behavior of natural populations. Other known traps seem to be adapted primarily for survey and control of populations, usually pests. Since it may be used for both cumulative and non-cumulative trapping, the researcher can use it at his convenience in population studies of blowflies.

LITERATURE CITED

Bishopp, F. C. 1916. Fly traps and their operation. USDA Farmers' Bull. 734: 1-13.

Bram, R. A. 1978. Surveillance and Collection of Arthropods of Veterinary importance. USDA, Agricult. Handbook No. 518, 125 p.

Broce, A. B., J. L. Goodenough and J. R. Coopedge. 1977. A Wind Oriented Trap for Screwworm Flies. J. Econ. Entom. 70 (4): 413-417.

Brockway, Jr., P. B. 1962. A Wind Directional Trap for Mosquitoes. Mosq. New 22: 404-405.

Coppedge, J. R., E. Ahrens, J. L. Goodenough, F. S. Guillot and J. W. Snow. 1977. Field Comparisons of Liver and a New Chemical Mixture as Attractants for the Screwworm Fly. Environm. Entom. 6: 66-68.

Coppedge, J. R., H. Brown, J. W. Snow and F. H. Tannahill. 1981. Bait Stations for the Suppression of Screwworm Populations. J. Econ. Entom. 74: 168-172.

Cunninham, R. T., S. Nakagawa, D. Y. Suda and T. Urago. 1978. Tephritid Fruit Fly Trapping: Liquid Food Baits in High and Low Rainfall Climats. J. Econ. Entom. 71: 762-763.

Williams, C. B. 1951. Comparing the Efficiency of Insect Traps. Bull. Entomol. Res. 42: 513-517.

Villegas, C. and L. Coto. 1981. Mosca del Mediterraneo (*Ceratitis capitata* (Wiedemann)). Bioliografia parcialmente anotada. IICA, CIDIA, Costa Rica. Docum. e Infor. Agric. No. 90, 166 p.

Vogt, W. G. and D. E. Havenstein. 1974. A Standardized Trap for Blowfly Studies. J. Aust. Entom. Soc. 13: 249-253.

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